

Appl. No. 10/774,537  
Attorney Docket No. 25968  
Reply to Office Action of March 29, 2006

**Amendments to the Drawings:**

The attached drawing sheets include changes to figures 1 – 3B. These sheets replace those original sheets including figures 1 – 3B.

## REMARKS/ARGUMENTS

Claims 1 – 10 are presented for reconsideration and further examination in view of the following remarks. Claim 11 has been canceled without prejudice or disclaimer to the subject matter claimed therein.

In the outstanding Office Action, the Examiner: objected to the drawings because Figures 1 – 3B fail to disclose that they are prior art; rejected claim 11 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement; rejected claims 1 – 11 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as his invention; rejected claims 1 – 3 and 6 – 11 under 35 U.S.C. 102(a), 102(b), 102(e), or 102(f) as being anticipated by Applicant's own acknowledged prior art; rejected claims 4 – 5 under 35 U.S.C. 103(a) as being unpatentable over the applicant's acknowledged prior art in view of U.S. Patent No. 6,014,297 to Clarey et al. (hereinafter referred to as "the Clarey et al. '297 patent"); and rejected claim 9 under 35 U.S.C. 103(a) as being unpatentable over the applicant's acknowledged prior art in view of U.S. Patent No. 6,697,238 to Bonilla et al. (hereinafter referred to as "the Bonilla et al. '238 patent.") The Examiner noted that claim 8 would be allowable if rewritten in independent form and further rewritten to overcome the rejection under 35 U.S.C. 112, second paragraph, set forth in the Office Action.

By this Response, applicant has amended the figures; has amended claims 1 – 4, 6, and 9; has canceled claim 11 without prejudice or disclaimer to the subject matter therein; and traverses the rejection to independent claim 1 and to claims 2 – 10 dependent therefrom.

It is respectfully submitted that no new matter within the meaning of 35 U.S.C. §132 has

been introduced to this application. Support for the amendments to claim 1 can be found in Figure 4, where the circuit (essentially just the impedance  $Z$ ) connecting the live and neutral conductors is clearly not significantly inductively coupled to the supply conductors.

### **Objection to the Drawings**

In the outstanding Office Action, the Examiner objected to the drawings because Figures 1 – 3B fail to disclose that they are prior art.

### **Response**

By this response, applicant submits replacement sheets of drawings which add the label “—Prior Art—” to Figures 1 – 3B.

Accordingly, Applicant requests that the Examiner withdraw the Objection to the Drawings.

### **Rejections Under 35 U.S.C. 112**

In the outstanding Office Action, the Examiner rejected claim 11 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement; and rejected claims 1 – 11 under 35 U.S.C. 112, second paragraph, as being indefinite. The Examiner particularly addressed the use of the terms “a current,” “this current,” and “such current” in claims 1 – 5, 6, and 9.

### **Response**

Reconsideration and withdrawal of the rejections are respectfully requested. The above amendments to claims 1 – 4, 6, and 9, are believed to fully and directly address the issues raised in the rejection under 112, second paragraph. Applicant submits that the rejections of claim 11 under 35 U.S.C. 112, first and second paragraphs, have been obviated by the cancellation of said claim. Hence, Applicant submits that the rejections of Claims 1-11 under 35 U.S.C. 112 are overcome.

### **Rejections Under 35 U.S.C. 102(a), 102(b), 102(e), or 102(f)**

In the outstanding Office Action, the Examiner rejected claims 1 – 3 and 6 – 11 under 35 U.S.C. 102(a), 102(b), 102(e), or 102(f) as being anticipated by the applicant's acknowledged prior art.

### **Response**

Reconsideration and withdrawal of the rejections are respectfully requested. By this Response, Applicant respectfully traverses the Examiner's rejection since the applicant's acknowledged prior art fails to disclose, teach, or suggest all of the features of amended claim 1.

Amended claim 1 recites a "residual current device (RCD)" including, inter alia, "means for detecting a double grounded neutral fault, said detection means comprising a circuit connecting the live and neutral conductors on the load side of the sensing means *substantially without inductive coupling to the live and neutral conductors*" (Present Application, Claim 1, Emphasis Added).

Applicant submits that the acknowledged prior art does not disclose, teach, or suggest "detection means comprising a circuit connecting the live and neutral conductors on the load side of the sensing means *substantially without inductive coupling to the live and neutral*

*conductors.*” The Examiner notes in the outstanding Office Action that figures 3A and 3B disclose “a circuit for detecting a double grounded neutral fault comprising means for causing a current to flow between the live and neutral conductors.” Applicant submits that such circuits in the prior art are substantially inductively coupled to the live and neutral conductors. Applicant draws the Examiner’s attention to page 5 of the Specification of the Present Application, which reads in part that

The double grounded neutral fault detection circuit of Figure 3A comprises a second current transformer CT2 which has a multiple turn winding W2 and an oscillator circuit OSC which induces a signal into the winding W2. In the event of a ground fault at the load neutral, the neutral and earth return paths will form a single loop, and *the signal induced into W2 will in turn be induced into this loop.* The oscillator signal will be seen by CT1 as a residual current, causing the RCD to trip.

The double grounded neutral fault detection circuit of Figure 3B comprises a second current transformer CT2 with a multiple turn winding W2 and an impedance Z which is connected in series with W2 and thence between the live and neutral conductors. Under normal conditions a current  $I_Z$  flows through W2, but in the absence of a double grounded neutral condition CT2 does not have a closed secondary winding. However, under a double grounded neutral condition, the neutral and earth return paths form a single loop which acts as a secondary winding on CT2. *The current  $I_Z$  induces a current into this loop,* and this current in turn is detected by CT1 as a residual or imbalance current, causing automatic tripping of the RCD. (Emphasis added.)

In the inventive subject matter disclosed in the Present Application, in the presence of a double grounded neutral the current  $I_Z$  is split into two components,  $I_{Z1}$  and  $I_{Z2}$ , whose amplitudes are determined solely by the ratio of the impedances to earth via the neutral conductor N through CT1 and via the ground fault NF avoiding CT1. The current  $I_{Z2}$  flowing through the grounded neutral NF on the load side of the sensing means CT1 avoids CT1 and thus reduces the amplitude of the current  $I_Z$  passing through CT1 by that amount. This imbalance is perceived as a residual current by CT1, and disconnects the supply. A similar analysis applies to

the embodiments of Figures 5 to 8, although in those cases the circuit connecting the two supply conductors is more complex and the current  $I_Z$  is intermittent, although in all cases there is *no inductive coupling to the supply conductors of the circuit connecting the two supply conductors*.

Thus, as the acknowledged prior art does not disclose, teach, or suggest “detection means comprising a circuit connecting the live and neutral conductors on the load side of the sensing means substantially without inductive coupling to the live and neutral conductors,” applicant submits that the acknowledged prior art cannot anticipate the presently claimed invention.

Additionally, Applicant submits that the additional amendments to claim 1 serve to better clarify the following distinction. In the circuit of Figure 3B, the current  $I_Z$  is also split into two parts,  $I_{Z1}$  and  $I_{Z2}$ , but here the relative amplitudes of  $I_{Z1}$  and  $I_{Z2}$  are not determined solely by the ratio of the impedances to earth via the neutral conductor N and the ground fault NF. Rather,  $I_{Z1}$  is enhanced by the current component induced into the neutral conductor by the winding W2. In the present application, the second transformer CT2 in Figure 3B is, surprisingly, unnecessary provided the current  $I_Z$  is sufficiently high. In other words, if the current  $I_Z$  is higher than in the case of the Figure 3B circuit, then this will compensate for the absence of the transformer CT2.

Therefore, Applicant respectfully submits that the acknowledged prior art fails to teach each feature of claim 1, and thus does not anticipate the claims.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection under 35 U.S.C. 102(a), 102(b), 102(e), of 102(f) of independent claim 1 and of dependent claims 2, 3, and 6 – 10 which depend therefrom. The rejection of claim 11 has been obviated by its cancellation.

### **Rejections Under 35 U.S.C. 103(a)**

In the outstanding Office Action, the Examiner rejected claims 4 – 5 under 35 U.S.C. 103(a) as being unpatentable over the applicant's acknowledged prior art in view of the Clarey et al. '297 patent, and rejected claim 9 under 35 U.S.C. 103(a) as being unpatentable over the applicant's acknowledged prior art in view of the Bonilla et al. '238 patent.

### **Response**

Reconsideration and withdrawal of the rejections are respectfully requested. By this Response, Applicant respectfully traverses the Examiner's rejection since the Clarey et al. '297 patent and the Bonilla et al. '238 patent fail to cure the deficiencies of the acknowledged prior art. The arguments set forth above with respect to the acknowledged prior art are incorporated herein by reference.

The Clarey et al. '297 patent is drawn to a multiwire branch circuit in which ground fault protection is provided for three ungrounded line conductors. In the Clarey et al. '297 patent, as in the acknowledged prior art, the ground fault detection means require substantial inductive coupling to the to the live and neutral conductors. "[T]he well-known dormant oscillator type ground fault detectors [are] employed....A ground fault on either of the line conductors 3 or 5 will create an imbalance in the currents which will be detected by the coil 27...If a ground fault is present on the neutral conductor, a loop completed by this ground fault will support an oscillation which will be detected by the ground fault circuitry." (the Clarey et al. 297 patent, col. 3, lines 42 – 58).

The Clarey et al. '297 patent fails to disclose, teach, or suggest "detection means

comprising a circuit connecting the live and neutral conductors on the load side of the sensing means substantially without inductive coupling to the live and neutral conductors.” Thus, the combination of references fails to show all of the claimed features of claim 1, from which claims 4 and 5 depend.

The Bonilla et al. ‘238 patent is drawn to a ground fault circuit interrupter in which, as in the acknowledged prior art, the ground fault detection means require substantial inductive coupling to the to the live and neutral conductors. “[C]onductors 176 and 174 pass through the magnetic cores 136 and 138 of the two transformers 132 and 134...The transformer 132 serves as a differential transformer for detecting a connection between the line side of the AC load and an earth ground, while the transformer 134 serves as a grounded neutral transformer for detecting a connection between the neutral side of the AC load and an earth ground... In the event that a connection occurs between the line side of the AC load and the ground... the current flowing to the conductors 176 and 174 will no longer precisely cancel and the net flux will be generated in the core 136 of the transformer 132.” (the Bonilla et al. ‘238 patent, col. 5 ln. 51 – col. 6 ln. 3).

The Bonilla et al. ‘238 patent fails to disclose, teach, or suggest “detection means comprising a circuit connecting the live and neutral conductors on the load side of the sensing means substantially without inductive coupling to the live and neutral conductors.” Thus, the combination of references fails to show all of the claimed features of claim 1, from which claim 9 depends.

Therefore, for at least the reasons listed above, Applicant respectfully submits that the Examiner has failed to make a *prima facie* case of obviousness. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections to dependent claims 4, 5, and 9.



### CONCLUSION

In light of the foregoing, Applicant submits that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicant respectfully requests that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

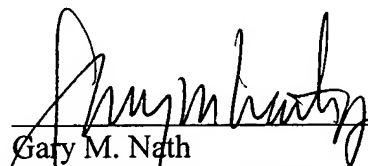
In the event this paper is not timely filed, Applicant petitions for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,

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